

Congressman Roscoe Bartlett
NUCLEAR ELECTROMAGNETIC PULSE
Congressional Record
US House of Representatives
June 9, 2005
@4:30pm Eastern

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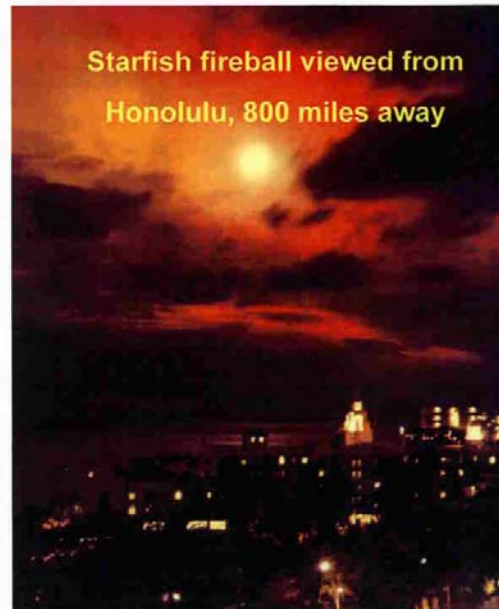
The SPEAKER pro tempore (Mr. *Mack*). Under the Speaker's announced policy of January 4, 2005, the gentleman from Maryland (Mr. *Bartlett*) is recognized for 60 minutes.

Mr. BARTLETT of Maryland. Mr. Speaker, the subject that I want to spend a few moments talking about this afternoon really began for our country in 1962. We were still testing nuclear weapons then, and for the first time the United States tested a weapon above the atmosphere. This weapon was detonated over Johnston Island in the Pacific. This was a part of a series of tests called the Fishbowl Series, and this was Operation Starfish in 1962. We had no prior experience with the detonation of a weapon above the atmosphere. We prepared for this test with airplanes and ships using radar and theodelites and instrumentation to measure the effects on the ground from a blast that was some 400 kilometers in altitude.

EMP Commission
Public Law 106-398,
Title XIV

EMP Threat: Historical Evidence

- STARFISH event, July 9, 1962
1.4 Megaton, 400 KM HOB,
Thor delivery vehicle, 800 nautical
miles from Honolulu
- EMP effects felt in Hawaii
 - coupling to Hawaiian electrical
transmission grid turns off nighttime
lights in Honolulu
 - Kanai telecom microwave outage
- Collateral effect: Sky swept clean of
of all commercial satellites within
six months



In conversations just today with Dr. Lowell Wood from Lawrence Livermore Laboratory, I learned more of the details of the results of that test. They had not anticipated the magnitude of the effects at the ground under the blast; so many of their instruments simply pegged and they were not able to get a clear indication of the effects. I might note that the Soviets had extensive testing experience with EMP over their own territory. They had a much larger territory than we and some of it quite remote; so they were able to instrument more extensively and had a lot more experience than we have had. This was our first and only experience with an exoatmospheric detonation of a nuclear weapon.

The effects over Hawaii, which was about 800 miles away, included several totally unexpected things; so there was no instrumentation on Hawaii to record the effects.

So all they can divine from the effects is what happened. Some street lights went out, and analysis after the fact indicated that these were the street lights that were oriented so that there was a very long line effect. In other words, the wires feeding the street lights constituted a very long antenna which received the signals from the detonation in space such that there was arcing and some of the street lights went out. This was investigated, and some of the failures were retained and were shown to a commission that I will talk about in a few minutes, Mr. Speaker, that spent 2 years studying these effects and the risk to our military and to our country.

There were other effects in communications and so forth. As I said, none of this was expected; so there was no instrumentation. We have since tried to determine the effects of what is called electromagnetic pulse produced by a nuclear detonation. We have done that with laboratory devices, some of them quite large that could expose a whole airplane, but none of them obviously large enough to include miles and miles of long-line effect.

The EMP pulse at that distance was estimated to be about five kilovolts per meter. We will have occasion in a little bit to talk about that in light of present capabilities. Because there was intense activity above the atmosphere, the Van Allen belts were pumped up; so there were a number of low Earth orbit satellites that decayed very rapidly as they passed through the Van Allen belts.

Mr. Speaker, I want to kind of put what we are going to say in context. So I want to indicate here some of the seriousness of EMP and its implications. In 1999, I sat in a hotel room in Vienna, Austria. I was there with 10 other Members of Congress and several staff members. We had there three members of the Russian Duma and a representative of Slobodan Milosevic. This was just prior to the resolution of the Kosovo conflict. We developed with them a framework agreement that was adopted about 5 days later by the G-8, which the Members may remember ended the Kosovo conflict.

One of the members of the Russian Duma was Vladimir Lukin, who was well known to this country because he was the ambassador here at the end of Bush I and the beginning of the Clinton administration. At that time he was a very senior member of the Russian Duma. He was very angry and sat for 2 days in that hotel room with his arms crossed looking at the ceiling. We had not early asked the Russians for help and they felt offended about that, and the statement he made expressing that sentiment was that "You spit on us. Now why should we help you?" And then he made a statement that stunned us. The leader of that delegation was the gentleman from Pennsylvania (Mr. *Weldon*), who speaks and understands some Russian. And when Vladimir Lukin was speaking, he turned to me and he said, "Did you hear what he said?"

Of course I heard what he said, but I did not understand it because I do not understand Russian.

But then it was translated, and this is what he said: "If we really wanted to hurt you with no fear of retaliation, we would launch an SLBM," which if it was launched in a submarine at sea,

we really would not know for certain where it came from. ``We would launch an SLBM, we would detonate a nuclear weapon high above your country, and we would shut down your power grid and your communications for 6 months or so."

The third-ranking communist was there in the country. His name is Aleksandr Shabonov, and he smiled and said, ``And if one weapon would not do it, we have some spares." I think the number of those spares now is something like 6,000 weapons.

This likely consequence of a high-altitude nuclear burst was corroborated by Dr. Lowell Wood, who in a field hearing at the Johns Hopkins University applied physics laboratory, made the observation that a burst like this above our atmosphere creating this electromagnetic pulse would be like a giant continental time machine turning us back to the technology of 100 years ago. It is very obvious that the population of today in its distribution could not be supported by the technology of 100 years ago. And I asked Dr. Wood, I said, ``Dr. Wood, clearly the technology of 100 years ago could not support our present population in its distribution," and his unemotional response was, ``Yes, I know. The population will shrink until it can be supported by the technology."

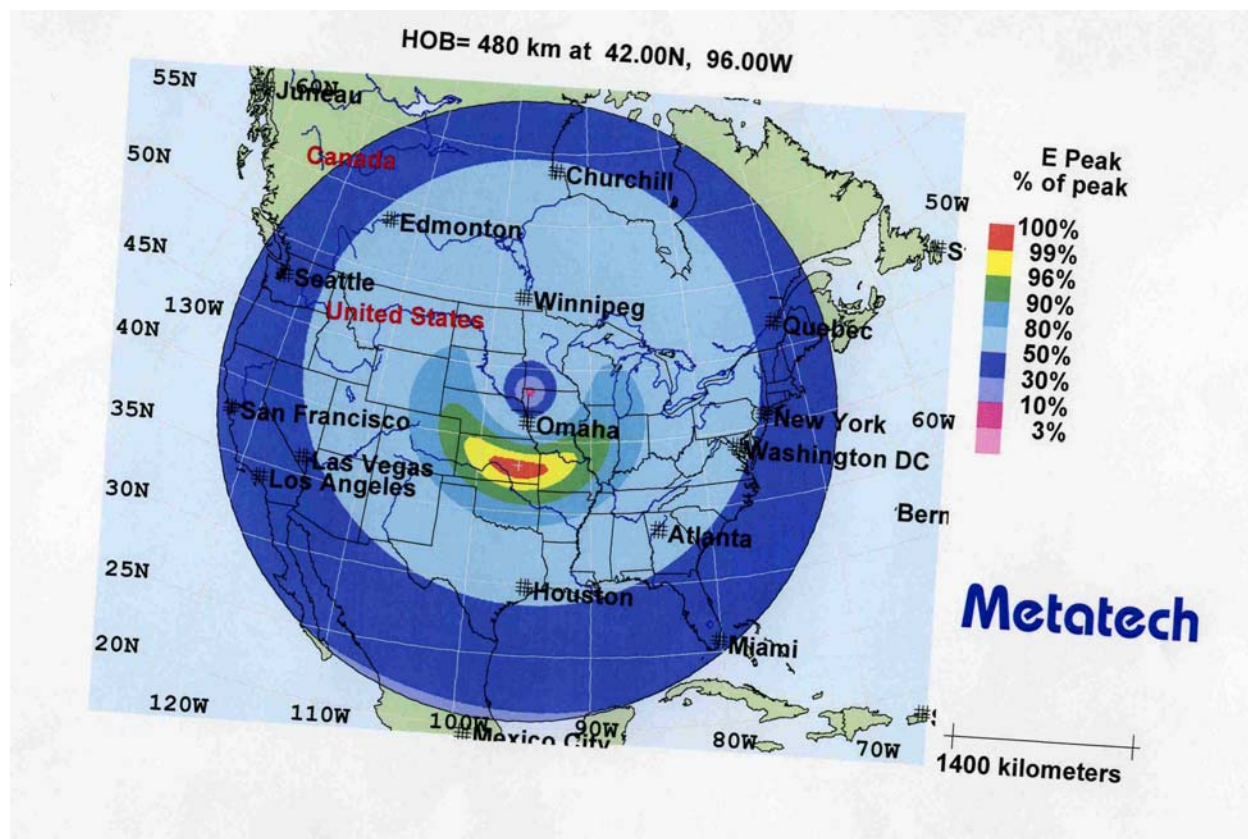
Just a word, Mr. Speaker, about what this EMP is. It is very much like a really giant solar storm. All of us are familiar with solar storms and with the disruption to our communication systems. And this is like a really giant solar storm. It is kind of like really intense static electricity everywhere all at once, all over the whole country. It is sort of like a lightning strike that is not just isolated to one spot. Different than a lightning strike in terms of the intensities and so forth and the spectrum, but it would be everywhere all at once over a very large area.

I have here in front of me the report, and I will have occasion to refer to that again a little later, the report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack. This is the executive summary. The report itself is very thick and there is a big classified addendum to the big report. And I just want to turn to one page here, and this is page 4, and it says: ``What is significant about an EMP attack is that one or a few high-altitude nuclear detonations can produce EMP effects that can potentially disrupt or damage electronic and electrical systems over much of the United States virtually simultaneously at a time determined by an adversary."

I talked a little bit about what EMP is. It produces a large number of Compton electrons above our atmosphere which are trapped by the magnetic fields around the Earth. They move at the speed of light. The prompt effects are such that if the voltage is high enough, all electronic equipment within line of sight is damaged or destroyed. These are called prompt effects. And, of course, satellites are very soft because it costs about \$10,000 a pound to launch a satellite; so they do not launch a lot of hardening on the satellite if they do not need to.

So all of the satellites within line of sight would be taken out by prompt effects. It would not go so high, by the way, as the satellites that are 22,500 miles above the Earth. And it would pump up the Van Allen belts so that satellites that were not in line of sight would die very quickly and one could not reconstitute the satellite network by launching new ones because they also would die quickly.

Let me show a chart here that shows the effects of this bomb exploding over the United States, and this shows a single weapon.



This shows a single weapon detonated at the northwest corner of Iowa, and it shows it at about 600 kilometers high, and this would blanket all of the United States. And the concentric circles here, not true circles because there is a little distortion of the electrical fields by the magnetic waves around the Earth, but these represent the intensity of the field that is produced by this. At the center we can see it is 100 percent. But even out at the margins of our country, it is down to 50 percent.

Now, a little later I will show a statement from some Russian generals that were reviewed by the people who put together this report, and they said that the Russians had developed weapons that produced 200 kilovolts per meter. Remember, the effects in Hawaii were judged to be the result of five kilovolts per meter. So this is a force about 200 times higher. The Russian generals said that they believed that to be several times higher than the hardening that we had provided for our military platforms that they could resist EMP.

Others know about EMP. I did not want anybody to believe that we were letting the genie out of the bottle and others did not know about that. I mentioned earlier the statement by Vladimir Lukin, the Russian member of their Duma, and this is the statement that I referred to here, and that was in May 2, 1999: "Chinese military writings described EMP as the key to victory and described scenarios where EMP is used against U.S. aircraft carriers in the conflict over Taiwan." So it is not like our potential enemies do not know that this exists. The Soviets had very wide experience with this, and there is a lot of information in the public domain relative to this.

"A survey of worldwide military and scientific literature sponsored by the commission," that is the commission that wrote this report, "found widespread knowledge about EMP and its potential military utility including in Taiwan, Israel, Egypt, India, Pakistan, Iran, and North Korea.

[Time: 16:45]

Terrorist information warfare includes using the technology of directed energy weapons. These are little weapons that produce an EMP-like effect, but over a very much more restricted area, and also electromagnetic pulse produced from nuclear weapons.

By the way, an enemy no more sophisticated than Saddam Hussein would need no more than a tramp steamer, a Scud missile and a crude nuclear weapon like is probably available in North Korea or might be bought or stolen from some Russian source. That would not shut down the whole United States, because the Scud missile could not carry it high enough, but it would certainly shut down the whole Northeast.

By the way, this is not like the Northeast blackout that we had a couple of years ago. This would produce damage that you would not recover from simply by turning a switch. It would probably destroy large transformers. These very large transformers are made to order, and if you need one, they will build you one, not in this country, we do not build the big ones anymore, they will build you one over in Europe or Japan, and it will take maybe a year-and-a-half to 2 years to get it. So it is not like you are going to recover from this tomorrow.

Iran has tested launching of a Scud missile from a surface vessel, a launch mode that could support a national or transnational EMP attack against the United States.

We have a second chart which shows more of the evidence that potential enemies out there know that this is a potential weapon.

EMP **Commission POTENTIAL ADVERSARIES KNOW ABOUT EMP**

- “Hypothetically, if Russia really wanted to hurt the United States in retaliation for NATO’s bombing of Yugoslavia, Russia could fire an SLBM and detonate a single nuclear warhead at high-altitude over the United States. The resulting EMP would massively disrupt U.S. communications and computer systems, shutting down everything.” –Russian Duma Leaders to U.S. Congressional Delegation (May 2, 1999)
- Chinese military writings describe EMP as the key to victory, and describe scenarios where EMP is used against U.S. aircraft carriers in a conflict over Taiwan
- A survey of worldwide military and scientific literature sponsored by the Commission found widespread knowledge about EMP and its potential military utility, including in Taiwan, Israel, Egypt, India, Pakistan, Iran and North Korea.
- Terrorist information warfare [includes] using the technology of directed energy weapons (DEW) or electromagnetic pulse (EMP). (Iranian Journal, March 2001)
- Iran has tested launching a Scud missile from a surface vessel, a launch mode that could support a national or trans-national terrorist EMP attack against the United States.

- “If the world’s industrial countries fail to devise effective ways to defend themselves against dangerous electronic assaults, then they will disintegrate within a few years...150,000 computers [belong] to the U.S. Army...if the enemy forces succeeded in infiltrating the information network of the U.S. Army, then the whole organization would collapse...the American soldiers could not find food to eat nor would they be able to fire a single shot.”

Electronics To Determine Fate Of Future Wars (Iranian Journal, December 1998)

- “Terrorist information warfare [includes] using the technology of directed energy weapons (DEW) or electromagnetic pulse (EMP).”
(Iranian Journal, March 2001)

- Terrorists have attempted to acquire non-nuclear radiofrequency weapons.

“If the world's industrial countries fail to devise effective ways to defend themselves against dangerous electronic assaults, then they will disintegrate within a few years. 150,000 computers belong to the U.S. Army. If the enemy forces succeed in infiltrating the information network of the U.S. Army, then the whole organization would collapse, the American soldiers could not find food to eat, nor would they be able to fire a single shot.”

I kind of think they would be able to find food to eat. This is from an Iranian journal, so you know they know about this and they are thinking about this.

“Terrorist information warfare includes using the technology of directed energy weapons, electromagnetic pulse.” I referred to that earlier.

Iran has conducted tests with its Shahab-3 missile that have been described as failures by the Western media because the missiles did not complete their ballistic trajectories, but were deliberately exploded at high altitude. This, of course, would be exactly what you would want to do if you were going to use an EMP weapon.

Today we are very much concerned, Mr. Speaker, about asymmetric weapons. We are a big, powerful country. Nobody can contend with us shoulder-to-shoulder, face-to-face. So all of our potential adversaries are looking for what we refer to as asymmetric weapons. That is a weapon that overcomes our superior capabilities. There is no asymmetric weapon that has anywhere near the potential of EMP.

Iran described these tests as successful. We said they were a failure because they blew up in flight. They described them as successful. Of course, they would be, if Iran's intent was practicing for an EMP attack.

Iran's Shahab-3 is a medium-range mobile missile that could be driven on to a freighter and transported to a point near the United States for an EMP attack. I might state that an early use of EMP is a common occurrence in Russia and Chinese war games.

I just would like to spend a moment or two talking about kind of the history of how we got here and why the big concern about EMP and the risk that it poses to us.

I mentioned Operation Starfish in 1962.

Then we really had a scary event which happened in 1995 when there was a Norwegian weather rocket that was set off. The Norwegians had told the Russians that they were going to

fire this weapon, but that did not get to the proper level. When the weapon was fired, it was interpreted by the Russians as a potential first strike of the United States against them and they had alerted their nuclear missile response. They came very close to launching.

In 1997 I had a very interesting experience. I am on the Committee on Armed Services. This was during the Clinton administration, and he had set up a Commission on Critical Infrastructure. General Marsh, retired, was chairing that Commission on Critical Infrastructure. This was infrastructure that was so critical that if an enemy could take it out, we would be very much disadvantaged by it. I asked him about EMP, had they looked at that?

His answer was, yes, they looked at it.

Well?

He said, well, we did not think there was a high probability that would happen, so we did not continue to look at it anymore.

I told him, gee, with that attitude, if you have not already, I am sure when you go home tonight you are going to cancel the fire insurance on your home.

What one needs when there is the potential for a very high-impact, low-probability event, is what we call insurance. I think that every American citizen has the right to ask their government, have you made the proper insurance investment to protect me, to protect my country, in the event, which we hope is not a high probability, in the event that there is an EMP attack against our country?

Your home burning, by the way, is not a high probability event. You may have a \$300,000 home and it may cost you \$300 for fire insurance for the year. So you can do the simple arithmetic that tells you the insurance company does not expect very many homes to burn that year.

Then the next event in this little timeline was my trip to Vienna, Austria, when I met there in that hotel room with Members of the Russian Duma. In 2001 we had some tests at Aberdeen with a device that was made using only the equipment that a terrorist might buy from Radio Shack or a place like that to see if you could put together a directed energy weapon, a weapon, by the way, that if sophisticated enough one might drive down Wall Street and take out all the computers in the financial market. It would not go further than that, but if it did that, that would, of course, be an enormous blow.

In 2001, the Commission was set up and then in 2004, last year, we have the report of the Commission.

I just would like to show you a chart now of the commissioners.

Commissioners

- Dr. John S. Foster, Jr. (Director LLNL; Director DDR&E)
- Mr. Earl Gjelde (Chief Engineer and Acting Director, Bonneville Power Administration; Under Secretary Dept of Interior, COO, Dep of Energy)
- Dr. William R. Graham (Chairman) (Director, OSTP; Science Advisor to President Reagan)
- Dr. Robert J. Hermann (Director, NRO; Principal Dep Asst Sec USAF; Senior Vice President, United Technologies)
- Mr. Henry (Hank) M. Kluepfel (VP SAIC; Advisor to the President's NSTAC)
- GEN Richard L. Lawson, USAF (Ret.) (DCINC US European Command; Director Plans and Policy JCS)
- Dr. Gordon K. Soper (PDATSD NCB; Director Nuclear Forces C3; Chief Scientist DCA)
- Dr. Lowell L. Wood, Jr. (Director's Staff LLNL; Technical Advisor, SSCI & HASC, Visiting Fellow, Stanford U. and Hoover Institution)
- Dr. Joan B. Woodard (Exec VP & Deputy Director Sandia National Labs)

Seven Commissioners were appointed by the Secretary of Defense and two by the Director of the Federal Emergency Management Agency

We will not have time to talk about the capabilities of all of these commissioners, but I will assure you that these are all giants in their area. They were appointed from among the foremost scientists, experts and military officers in the United States to achieve a mix of talent on scientific aspects of EMP, nuclear weapon design, military implications of EMP and the effects of EMP on civilian and military infrastructures.

Dr. William Graham, the Commission chairman, was science advisor to President Reagan. He ran NASA and was one of the first scientists to study the EMP phenomenon when it was first discovered by its United States in 1962.

Commissioner John Foster, Johnny Foster, who designed most of the nuclear weapons in the inventory the United States today, was a director of the Lawrence Livermore National Laboratory, and for decades has been a close adviser to the Department of Defense on nuclear matters.

Dr. Lowell Wood is a member of the director's staff at Lawrence Livermore National Laboratory where he inherited the scientific mantle of Dr. Edward Teller, the inventor of the hydrogen bomb.

I had a very interesting personal experience related to Dr. Lowell Wood. When I became interested a number of years ago in EMP and the potential implications, I knew that Tom Clancy, who lives in Maryland and he has come to do several events for me, I knew that he had a novel in which EMP was one of the sequences in his novel. I know that Tom Clancy does very good research. So I called to ask him about EMP and its implications.

He said that if I had read his book, I probably knew as much about EMP as he knew, but he was going to refer me to what he said was in his view was the smartest person hired by the U.S.

Government, and that was Dr. Lowell Wood. So Dr. Lowell Wood comes with great recommendations.

Commissioner Richard Lawson was a USAF general, served on the Joint Chiefs of Staff and was Deputy Commander-in-Chief of the U.S.-European Command.

Dr. Joan Woodard, I had a very interesting experience with Dr. Woodard. I was visiting my son and daughter and children out in Albuquerque, he works at the Sandia Labs, and he brought home a little note talking about a seminar they were having which was exploring some issues that I thought would be relevant to the work that the Commission was doing. I did not know at that time that she was a member of the Commission.

So I asked for a briefing, and I spent 5 hours in a classified briefing at Sandia Labs. And it was not just Dr. Joan Woodard, it was a large number of people at the labs there that were focusing primarily on the national infrastructure consequences of this.

What I would like to do now is go through some of the statements and recommendations of the report. The next chart shows the threat and the nature and magnitude of EMP threats within the next 15 years.

EMP Commission
Public Law 106-398,
Title XIV

Threat: Nature and Magnitude of EMP Threats Within the Next 15 Years

- EMP is one of a small number of threats that may
 - Hold at risk the continued existence of today's US civil society
 - Disrupt our military forces and our ability to project military power
- The number of US adversaries capable of EMP attack is greater than during the Cold War
- Potential adversaries are aware of the EMP strategic attack option
- Threat not adequately addressed in US national and homeland security programs



Vulnerability may be an invitation to attack

9

On the right you see the coverage that is produced by weapons detonated at various altitudes. I mentioned 600 kilometers. Actually 500 kilometers pretty much covers the margins of our country and, of course, the lower the altitude you detonate it, the less area that it covers, but the higher will be the intensity of the pulse that is produced.

This is a direct quote from the EMP Commission report: ``EMP is one of a small number of threats that may hold at risk the continued existence of today's U.S. civil society."

Now, that is couched in the careful kind of scientific terms, but what that really means is that a really robust EMP laydown, which, as Vladimir Lukin in that hotel room in Vienna, Austria said, would shut down our power grid and communications for 6 months or so. And if one weapon would not do it, as Aleksandr Shabonov said, four absolutely would do it, particularly with the power of the weapons that the Russian generals say that they have developed.

What this would do is to produce a society in which the only person you could talk to was the person next to you, unless you happened to be a ham operator with a vacuum tube set, which, by the way, is 1 million times less susceptible to EMP than your present equipment that the hams use. And the only way you could get anywhere was to walk, because, you see, if the pulse is intense enough, it turns off all the computers in your car. There will be no electricity, so even if the car ran, you could not get gas.

By the way, if you have a car that still has a coil and distributor, you are probably okay, because those are pretty robust structures compared to today's cars with so much microelectronics in them.

It would disrupt our military forces and our ability to project military power. For the last decade, Mr. Speaker, we have been waiving hardening on essentially all of our military platforms because it costs maybe as little as 1 percent, maybe like 5 percent more to harden. It can be done. That is the good news story. If you do not harden, you can get 5 percent more weapons systems. And since we have had so little money during those years, the Pentagon opted to run this risk. With terrorists about, I think that is probably a risk we do not want to continue to run.

The number of U.S. adversaries capable of EMP attack is greater than during the Cold War. We may look back with some fondness on the Cold War. We then had only one potential adversary. We knew him quite well.

[Time: 17:00]

Now we have who knows how many potential adversaries, and they come from very different cultures than we, and we have a great deal of difficulty in understanding them and communicating with them.

Potential adversaries are aware of the EMP's strategic attack option. I started, Mr. Speaker, with talking about the fact that I was not letting the genie out of the bottle. Ninety-nine percent of Americans may not know very much about EMP, but I will assure you, Mr. Speaker, that 100 percent of our potential enemies know all about EMP. I think that the American people need to know about EMP because they need to demand that their government do the prudent thing so that we will be less and less susceptible, less and less at risk to an EMP attack year by year. The threat is not adequately addressed in U.S. national and homeland security programs. Not only is it not adequately addressed; it is usually ignored, not even mentioned, and it certainly needs to be considered.

I might note that Senator John Kyl, with whom I served in the House on the Committee on Armed Services, wrote just a couple of weeks ago a very nice editorial in the Washington Post, and we will have his quote a little later, on EMP effects and how we need to be about preparing ourselves for that.

Terrorists could steal, purchase, or be provided a nuclear weapon and perform an EMP attack against the United States simply by launching a primitive Scud missile off a freighter near our shores. We do not need to be thinking about missiles coming over the Pole. There are thousands of ships out there, particularly in the North Atlantic shipping lanes, and any one of them could have a Scud missile on board. If you put a canvas over it, we cannot see through the thinnest canvas. We would not know whether it was baled hay or bananas or a Scud launcher. You cannot see through any cover on ship. The Commission on the Emerging Ballistic Missile Threat chaired by Secretary Rumsfeld before he was Secretary, and Dr. Bill Graham, the chairman of this commission was his vice-chair, found that ships had been modified so that they had missile-launching tubes in ordinary freighters. You can read that in their report.

Scud missiles can be purchased on the world market today for less than \$100,000. Al Qaeda is estimated to own about 80 freighters, so all they need, Mr. Speaker, is \$100,000, which I am sure they can get, for the missile and a crude nuclear weapon.

Certain types of low-yield nuclear weapons can generate potentially catastrophic EMP effects. These certain types of weapons are weapons that have been designed for enhanced EMP effects. They may have little explosive effect, but very high EMP effects over wide geographic areas, and designs for various such weapons may have been illicitly trafficked for a quarter of a century. We are certain that the Chinese have them. Of course the Russians have them; they developed probably better or at least as good designs as we developed. We designed them, by the way, but never built them. The Russians we understand have both designed and built them, and we now believe those designs to be pretty widespread out around the world.

The next chart shows the comments from the Russian generals, and to protect the Russian generals we have redacted their names.

**EMP
Commission**

A WARNING FROM RUSSIAN GENERALS

**The Commission met with Russian Generals
And , who claimed:**

- **Russia designed a Super-EMP” nuclear weapon capable of generating 200 kilovolts per meter**
- **Russian, Chinese, and Pakistani scientists are working in North Korea, and could enable that country to develop an EMP weapon in the near future**

But the commission met with Russian generals, and they claim that Russia has designed a super-EMP nuclear weapon capable of generating 200 kilovolts per meter. And the Russian generals told our commission people that they believe that to be several times higher than the level two,

which we had hardened our weapons systems; even those that are hardened and, as I mentioned, Mr. Speaker, most of our weapons systems now procured are not hardened.

Russian, Chinese, and Pakistani scientists are working in North Korea and could enable that country to develop an EMP weapon in the near future. Now, this is not what the commission said; this is what the commission reported the Russian generals to have said.

The next chart shows additional comments from the EMP Commission report.

***EMP
Commission***

WHY EMP?

States or terrorists may well calculate that using a nuclear weapon for EMP attack offers the greatest utility

- **EMP offers a “bigger bang for the buck” against US military forces in a regional conflict; or a means of damaging the US homeland**
- **EMP may be less provocative of US massive retaliation, compared to a nuclear attack on a US city that inflicts many prompt casualties**
- **EMP could, compared to a nuclear attack on a city, kill many more Americans in the long run, from indirect effects of collapsed infrastructures of power, communications, transportation, food and water**
- **Strategically and politically, EMP attack can: threaten entire regional or national infrastructures that are vital to US military strength and societal survival; challenge the integrity of allied regional coalitions; and pose an asymmetrical threat more dangerous to the high-tech West than to rogue states**
- **Technically and operationally, EMP attack can compensate for deficiencies in missile accuracy, fusing, range, reentry vehicle design, target location intelligence, and missile defense penetration**

States or terrorists may well calculate that using a nuclear weapon for EMP attack offers the greatest utility. Mr. Speaker, there is no way that a country could use a nuclear weapon against the United States that would be as devastating as using it to produce an EMP lay-down. I had not noted, but I should note, Mr. Speaker, that there is no effect on you or me from this weapon. We are quite immune to that. We will not be damaged by that. Buildings will not be damaged by that. It will affect only electric and electronic equipment.

EMP offers a bigger bang for the buck. Now, this is from their report; I am not saying this. EMP offers a bigger bang for the buck against U.S. military forces in a regional conflict or a means of damaging the U.S. homeland. EMP may be less provocative of U.S. massive retaliation compared to a nuclear attack on a U.S. city that inflicts many prompt casualties.

Just a couple of words about this. As Vladimir Lukin said, if it were launched from the ocean, we would not know who launched it. So against whom would we retaliate? Even if we knew who

launched it, Mr. Speaker, if all they have done is to disable our computers, do we respond in kind, or do you incinerate their grandmothers and their babies? This would be a really tough call. Responding in kind might do very little good. There is no other country in the world that has anything like our sophistication in electronic equipment, and no other country in the world is so dependent as we are on our national infrastructure. So this is a real problem and a big incentive to use this weapon without fear of retaliation, as Vladimir Lukin says, with no fear of retaliation.

EMP could, compared to a nuclear attack on the city, kill many more Americans in the long run from indirect effects of collapsed infrastructures of power, communications, transportation, food, and water. Can you imagine our country, Mr. Speaker, with 285 million people, no electricity, and there will be no electricity, no transportation, no communication? The only way you can go anywhere is to walk, and the only person you can talk to is the person next to you. What would we do? How many of our people might not survive the transition from that situation to where you had established a sort of infrastructure that could support civil society as we know it today.

Strategically and politically, an EMP attack can threaten entire regional or national infrastructures that are vital to U.S. military strength and societal survival, challenge the integrity of allied regional coalitions, and pose an asymmetrical threat more dangerous to the high-tech West than to rogue states. This makes the point that I was making that because we are the most sophisticated, we are the most vulnerable.

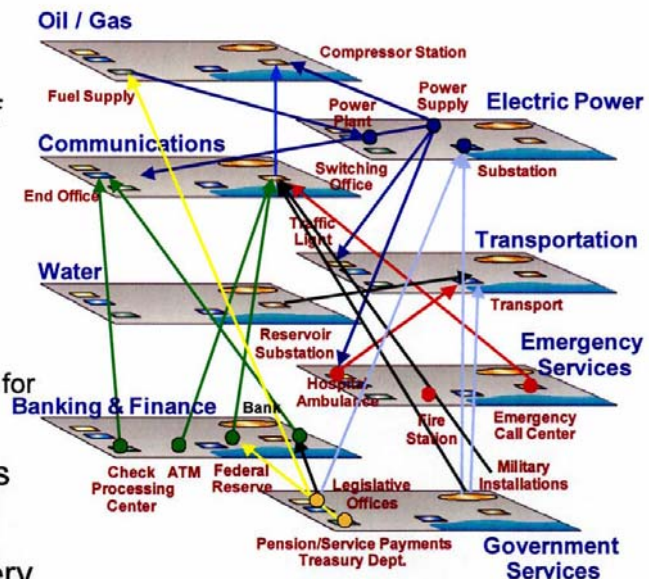
Technically and operationally, EMP attacks can compensate for deficiencies in missile accuracy, fusing range, reentry, velocity design, target location, intelligence, and missile defense penetration. We are really superior in all of these areas, and none of our enemies out there, except for Russia and China, and we would not expect an attack like this from either of them, but there is nobody else out there who really can be very good shots with their missiles.

But what the EMP Commission report is pointing out is, they do not need to be. Anywhere over the northeastern United States will shut down all of the northeastern United States, and anywhere near the middle of our country, you can miss it by 100 miles and it really will not matter. Anything near the middle of our country detonated high enough with the right kind of weapon will blanket the whole country with an EMP force that could knock out all of our electronic equipment.

The next chart shows some other comments in the EMP report. One or a few high-altitude nuclear detonations can produce EMP simultaneously over wide geographical areas.

Vulnerability of US Military and Civilian Systems

- One or a few high-altitude nuclear detonations can produce EMP, simultaneously, over wide geographical areas
- Unprecedented cascading failure of our electronics-dependent infrastructures could result
 - Power, energy transport, telecom, and financial systems are particularly vulnerable and interdependent
 - EMP disruption of these sectors could cause large scale infrastructure failures for all aspects of the Nation's life
- Both civilian and military capabilities depend on these infrastructures
- Without adequate protection recovery could be prolonged—months to years



As the chart we showed earlier, the whole country can be blanketed with one about 600 kilometers high.

The thing they were really concerned about, because we have a very sophisticated infrastructure with lots of interdependencies, they were really concerned about the cascading failure, unprecedented cascading failure of our electronics-based infrastructures, which could result in power, energy, transport, telecom, and financial systems and are particularly vulnerable and interdependent. And if one of them comes down, if you bring down the power grid, Mr. Speaker, you have brought down all of these other parts of our national infrastructure. EMP disruption of these sectors could cause large-scale infrastructure failures for all aspects of the Nation's life.

Now, these are not my words; these are taken from the EMP Commission report. This commission was set up as a part of public law, and that is noted here on this chart.

Both civilian and military capabilities depend on these infrastructures. Without adequate protection, recovery could be prolonged months to years for recovery. And here on the right is a little depiction showing some, and there are more than that, showing some of the interrelationships. For instance, electric power is not shown as important for water or for banking and finance, and for government services; and of course it is. So if you do not have electric power, for instance, you do not have any of these other things.

There was a number of years ago a scientist by the name of Harrison Scott Brown. I think that he worked at CalTech, and he offered a series of seminars called the ``Next 100 Years." This was during the Cold War. And one of the questions that it was appropriate to ask during the Cold War was, What would you do after the nuclear attack? You may remember, Mr. Speaker, your parents talking about the backyard shelters that were built during the 1960s. Sometime after that I went to work for IBM and they were still talking about the fact that IBM had loaned its employees money interest-free to build a backyard shelter. There was a real concern that there could be a bolt out of the blue and that we could have a nuclear attack. We had a big civil defense organization with lots of shelters. They were stocked, and you were given pamphlets and you were told where to go.

I think, Mr. Speaker, that today, with the potential for terrorist attack, we need to turn back a few pages and learn from our experience during the Cold War when we recognized that the more prepared an individual and a family was to be self-sufficient during that attack, the stronger we would be as a whole; and I think that we could profit, at least have a more intense focus on civil defense in our homeland security efforts.

Harrison Scott Brown was concerned about what you would do after you came out of the fallout shelter and how you would reconstitute your society to reestablish the kind of an infrastructure that you had before the attack. His concern was that in the United States, and this was a number of years ago, his concern would be even greater were he alive today, his concern then was that we had developed such a sophisticated, interrelated infrastructure, that if it came down like a house of cards, that it might be very difficult, maybe, he thought, and I will explain in a moment why, maybe impossible to reestablish that infrastructure. Because, he noted, that this infrastructure was built up gradually from very simple to very complex, when there was available to us a rich resource of raw materials, high-quality iron ore. That is all gone. Our best ores now, I think, are 1/2 of 1 percent taconite ores.

[Time: 17:15]

When oil essentially oozed out of the ground, when the water washed the dirt away, you could see coal exposed in some of the hills of Pennsylvania. The oil now is deep and hard to get or offshore or in the Arctic. All the good coal has been burned. Now, to get oil and to get coal, we have to have the infrastructure. You have to have diesel fuel shipped to you. You have to have large excavators.

His concern was that if our infrastructure collapsed as a result of a nuclear attack, today we are talking about an EMP attack, which does not blow up buildings, but it shuts down the infrastructure because it would destroy, disrupt all of the electronic equipment if the pulse was high enough; and a determined, sophisticated enemy could make sure that it was high enough.

So he was concerned that maybe it would not be possible now without that high-quality, readily available resource of raw materials that might be very difficult without massive help from other parts of the world that we could reconstitute our society.

I think, Mr. Speaker, that we need to be looking at that threat to our country today. I am sure it is no less a threat now than it was when Harrison Scott Brown was holding those seminars.

In 2004, the EMP Commission met with very senior Russian officers, and we showed that on the sign. They warned that the knowledge and technology to develop what they called super

EMP weapons had been transferred to North Korea and that North Korea could probably develop these weapons in the near future, within a few years.

The Russian officers said that the threat that would be posed to global security by a North Korean armed with super EMP weapons was, in their view, and I am sure, Mr. Speaker, in your view and mine, unacceptable.

You know, why use EMP, as we noted in a previous chart? A terrorist or rogue state might be so inaccurate that they could not even use a nuclear weapon to take out New York City. They might hit the countryside somewhere near. But it would not really matter with that low accuracy if they were doing an EMP laydown. Because anywhere over New England would be quite good enough, and there is no way that they could do as much damage to our country by a ground burst, even if it hit the city, than if they could do a high altitude burst, which produced EMP and took down, if it was intense enough, all of our infrastructure.

EMP has such a wide area of effect that if the weapon is large enough or several are used, covering potentially an entire continent, that even a highly inaccurate missile could not miss its target in an EMP effect. EMP attack involves exoatmospheric detonation, meaning that attack, this is really interesting, Mr. Speaker, this attack would occur before the weapon ever reentered the atmosphere. So even if we were really good at taking out weapons before they hit us, it really would not matter, because this is detonated before it starts to reenter. So any weapon that would take out a missile on its final descent would be useless, because it has already detonated and the damage is done at altitude.

Increased dependence on advanced electronic systems results in the potential for an increased EMP vulnerability. And what this does is to make that attack more attractive to our assailants. The fact that we are ever more sophisticated and therefore ever more vulnerable makes it ever more attractive to our adversaries, because this really becomes the ultimate asymmetric weapon.

EMP threatens the ability of the United States and western nations to project influence and military power, because a third-world country with a crude missile and a crude nuclear weapon could, in effect, hold us hostage. This is why it is so important that we stop the spread of nuclear weapons.

EMP can cause catastrophic damage to the Nation by destroying the electric power infrastructure, causing cascading failures in the infrastructure for everything: telecommunications, energy, transportation, finance, food, and water.

I live on a farm. I cannot even get a drink of water without electricity, because the pump in my well that supplies my water has to have electricity. So we are all really dependent on this infrastructure.

Degradation, and this is really minimized, degradation of the infrastructures could have irreversible effects on the country's ability to support its population, and then millions could die. That is true.

In the final analysis, Mr. Speaker, the EMP Commission report is really a good news story. So far what we have been talking about does not really sound like good news, does it? It sounds like the worst of all news that you could get. But there really is good news here, and the good news is that we do not have to be this vulnerable. It is really not all that expensive to protect our systems against EMP. You just have to do it.

We Can Do Something About It: Strategy and Recommendations:

- Address threats by preventing attack and limiting damage
 - Prevention--the highest priority is to prevent attack
 - *Shape global environment to reduce incentive for antagonists to create weapons; pursue intelligence, interdiction and deterrence to discourage EMP attack*
 - *Suppress ability to create them by making it difficult and dangerous to try*
 - *Counter creation and use of EMP weapons by threatening military and other violent response,*
 - *Establish a coherent global force to intervene*
 - Limiting damage in the event prevention fails
 - *Demonstrate will and capability to protect our most critical infrastructures, protect critical components with particular emphasis on those requiring long time to replace or repair – power and telecommunications are key*
 - *Demonstrate will and capability to recover from any attack*

Susceptibility invites attack, therefore:

- Prevent attack, while
- Planning and preparing to limit damage in the event prevention fails

But we have a problem, and that is the cheapest way to do it is when you are making them, if you design it in. Then it may cost as little as 1 percent more. For really sophisticated electronic stuff, probably not more than 10 percent more. But if you are trying to add it after it is built, then it can cost you as much as the device itself, which means that we need to start, you can only do what you can do, and we need to start in our national infrastructure by deciding what is most essential to protect and then expeditiously protecting that as fast as we can.

Every new water system we put in, every new sewage system we put in, every new power line we run, every new distribution system we put in needs to be hardened. It is not all that expensive to do. You just need to do it.

Now we have hardened in the military our command and control. We are pretty sure that we can talk to each other after an EMP laydown. But that does not give me much solace, Mr. Speaker, because that is the equivalent of me having my brain and spinal cord work, but my arms and my hands will not work. I am not sure just having the capability of my brain communicating with my spinal cord does me much good if my arms and my legs will not respond to those signals.

The EMP Commission has proposed a 5-year plan that, if implemented, would protect the United States from the catastrophic consequences of EMP attack and make recovery possible at surprisingly modest cost.

I would like now to turn to a statement that was made by Dr. John Kyl. I mentioned his name earlier. Last week, the Senate Judiciary Committee Subcommittee on Terrorism, Technology and

Homeland Security, which I chair, his words in his op-ed piece, held a hearing on a major threat to the United States not only from terrorists but from rogue nations like North Korea.

An EMP attack is one of only a few ways that America could be essentially defeated by our enemies, terrorists or otherwise. Few if any people would die right away, but the long-term loss of electricity would essentially bring our society to a halt. Few can conceive of the possibility that terrorists could bring American society to its knees by knocking out our power supply from several miles in the atmosphere. But this time we have been warned, and we better be prepared to respond. We really do need to respond.

Washpost.com

Unready For This Attack

By Jon Kyl

Saturday, April 16, 2005; Page A19

Recently a Senate Judiciary subcommittee of which I am chairman held a hearing on a major threat to the American people, one that could come not only from terrorist organizations such as al Qaeda but from rogue nations such as Iran and North Korea.

An electromagnetic pulse (EMP) attack on the American homeland, said one of the distinguished scientists who testified at the hearing, is one of only a few ways that the United States could be defeated by its enemies -- terrorist or otherwise. And it is probably the easiest. A single Scud missile, carrying a single nuclear weapon, detonated at the appropriate altitude, would interact with the Earth's atmosphere, producing an electromagnetic pulse radiating down to the surface at the speed of light. Depending on the location and size of the blast, the effect would be to knock out already stressed power grids and other electrical systems across much or even all of the continental United States, for months if not years.

Few if any people would die right away. But the loss of power would have a cascading effect on all aspects of U.S. society. Communication would be largely impossible. Lack of refrigeration would leave food rotting in warehouses, exacerbated by a lack of transportation as those vehicles still working simply ran out of gas (which is pumped with electricity). The inability to sanitize and distribute water would quickly threaten public health, not to mention the safety of anyone in the path of the inevitable fires,

which would rage unchecked. And as we have seen in areas of natural and other disasters, such circumstances often result in a fairly rapid breakdown of social order.

American society has grown so dependent on computer and other electrical systems that we have created our own Achilles' heel of vulnerability, ironically much greater than those of other, less developed nations. When deprived of power, we are in many ways helpless, as the New York City blackout made clear. In that case, power was restored quickly because adjacent areas could provide help. But a large-scale burnout caused by a broad EMP attack would create a much more difficult situation. Not only would there be nobody nearby to help, it could take years to replace destroyed equipment.

Transformers for regional substations, for example, are massive pieces of equipment that are no longer manufactured in the United States and typically take more than a year to build. In the words of another witness at the hearing, "The longer the basic outage, the more problematic and uncertain the recovery of any [infrastructure system] will be. It is possible -- indeed, seemingly likely -- for sufficiently severe functional outages to become mutually reinforcing, until a point at which the degradation . . . could have irreversible effects on the country's ability to support any large fraction of its present human population." Those who survived, he said, would find themselves transported back to the United States of the 1880s.

This threat may sound straight out of Hollywood, but it is very real. CIA Director Porter Goss recently testified before Congress about nuclear material missing from storage sites in Russia that may have found its way into terrorist hands, and FBI Director Robert Mueller has confirmed new intelligence that suggests al Qaeda is trying to acquire and use weapons of mass destruction. Iran has surprised intelligence analysts by describing the mid-flight detonations of missiles fired from ships on the Caspian Sea as "successful" tests. North Korea exports missile technology around the world; Scuds can easily be purchased on the open market for about \$100,000 apiece.

A terrorist organization might have trouble putting a nuclear warhead "on target" with a Scud, but it would be much easier to simply launch and detonate in the atmosphere. No

need for the risk and difficulty of trying to smuggle a nuclear weapon over the border or hit a particular city. Just launch a cheap missile from a freighter in international waters -- al Qaeda is believed to own about 80 such vessels -- and make sure to get it a few miles in the air.

Fortunately, hardening key infrastructure systems and procuring vital backup equipment such as transformers is both feasible and -- compared with the threat -- relatively inexpensive, according to a comprehensive report on the EMP threat by a commission of prominent experts. But it will take leadership by the Department of Homeland Security, the Defense Department, and other federal agencies, along with support from Congress, all of which have yet to materialize.

The Sept. 11 commission report stated that our biggest failure was one of "imagination." No one imagined that terrorists would do what they did on Sept. 11. Today few Americans can conceive of the possibility that terrorists could bring our society to its knees by destroying everything we rely on that runs on electricity. But this time we've been warned, and we'd better be prepared to respond.

The writer is a Republican senator from Arizona and chairman of the Senate Judiciary subcommittee on terrorism, technology and homeland security.

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Here is another statement from Major Franz Gayl.

The impact that EMP is asymmetric in relation to our adversaries, now these are all in the public domain. I want to be very careful, Mr. Speaker, that I do not leave the impression that I am letting the genie out of the bottle. Ninety-nine percent of Americans may not know about EMP, but I will guarantee you 100 percent of our adversaries know about EMP. And we need to know about EMP, because to be forewarned is to be forearmed, and we need to do something about that.

[Insert Gayl op-ed]

The impact that EMP is asymmetric in relation to our adversaries, the less developed societies in North Korea, Iran and other potential EMP attack perpetrators are less electronically

dependent and less specialized, while more capable of continued functionality in the absence of modern conveniences.

I do not know that outside of Pyongyang that many people in North Korea would even know if electricity went out. I am not sure they depend much on electricity.

Conversely, the United States would be subject to widespread paralysis and doubtful recovery following a surprise EMP attack. Therefore, terrorists and their coincidentally allied state sponsors may determine that, given just a few nuclear weapons and delivery vehicles, that subjecting the United States to a potentially non-attributable EMP attack, we would not even know where it came from if it came from the oceans, is more desirable than the destruction of selected cities. Delayed mass lethality is assured over time through the cascade of EMPs' indirect effects that would bring our highly specialized and urbanized society to a disorderly halt.

The vulnerability of the United States to EMP attack serves as the latest revelation that societal protections associated with our national security can no longer be assured by traditional nuclear deterrence and battlefield preparations on their own.

Let me put up now a conclusion chart.

EMP Commission
Public Law 106-398,
Title XIV

Danger of EMP Attack Can Be Mitigated

- Our free, modern society has inherent vulnerabilities that cannot be completely eliminated
- Catastrophe can be averted by practical and affordable steps to
 - *Prevent* attacks,
 - *Prepare* to recognize and respond to an EMP attack
 - *Protect* critical infrastructure elements and strategic military capabilities, and
 - *Recover* following attack
- National security and homeland security are Federal responsibilities that should be funded by the Federal government

In just a few years we can make significant, affordable improvements to protect society even if an EMP attack is carried out against us

The EMP threat is one of a few potentially catastrophic threats to the United States. By taking action, the EMP threat can be reduced to manageable levels, but we should have started yesterday, Mr. Speaker. We just must start today.

U.S. strategy to address the EMP threat should balance prevention, preparation, protection and recovery. We need to be studying all four of these. Critical military capabilities must be survivable and enduring to underwrite U.S. strategy. If they can bring down our military, that really puts us at risk.

The 2006 Defense Authorization Bill contains a provision extending the EMP Commission to ensure that their recommendations will be implemented. We need to have them around to make sure that we are following through on their recommendations. Terrorists are looking for vulnerabilities to attack, and our civilian infrastructure is particularly susceptible to this kind of attack. It needs to be hardened.

When you have a weak underbelly, you are inviting attack there. They are going to attack at the weakest link, and our infrastructure complexity is certainly our weakest link. The Department of Homeland Security needs to identify critical infrastructures. What do we need to protect first?

Then we need to have a plan for what would we do if we had the EMP attack tomorrow, the day after tomorrow, the next year, 5 years from now. How far along would we be in protecting ourselves? But we need to have a plan for what we would do in the event that that happens.

The Department of Homeland Security also needs to develop a plan, I really want to emphasize this, Mr. Speaker, to help citizens deal with such an attack should it occur. Each of us as individuals, each of us as families, each of us as a church group, each of us as a community, needs to have plans for what we would do in the event of an EMP attack. We need to know what we need to do to prepare so that we are not going to be a liability on the system. Our strength as a Nation is going to be greatly increased if each of us as a family, a church group, a community, is prepared so that we will be less susceptible to the loss of these infrastructure supports.

Mr. Speaker, this is really a good news story. We know about this problem. It has not happened yet. We have a great study with great detailed recommendations of what we need to be doing. The good news is that if we do these things we will have reduced our vulnerability and we will have now taken from the enemy an enormous strategic capability that they now have because we are such a sophisticated society, depend so much on our infrastructure, and if they can bring down an infrastructure they can bring us down.

We have a mighty Army. It will not be much good if the folks back home do not have anything to eat.

Mr. Speaker, to be forewarned is to be forearmed. I am sure Americans will respond to this challenge. And challenges are really exhilarating. You feel really good at night if you have met a challenge and you have had some successes in meeting that challenge.

Mr. Speaker, I think we have a bright future ahead, and it is going to be even brighter if we respond appropriately to the warnings that are here.